hearth of this furnace is constantly covered with a layer of air,
and why the waste gases, as analyzed by M. Asseyew, showed 3.85 per cent of CCb and 16.65 per cent of 62- This was the cause of the abandonment of these furnaces at the Alapayewsky works.

The conclusion that the good or bad working qualities of plate-heating furnaces depended upon the height of the working opening was entirely unlocked for at this time. Since then this conclusion has been completely verified. There is no doubt whatever that this is only one of the numerous surprises which will be revealed by the application of the hydraulic theory to furnaces,

X. THE APPLICATION TO HOT GASES OF THE THEORY OF JETS OF WATER

If the resistance due to friction in the pipes and in the air is neglected the vertical height to which a vertical jet of water will rise will be equal to the head and will be

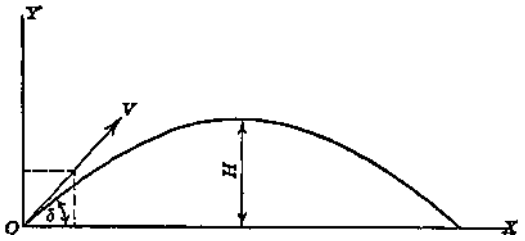

FIG. 42.

The jet from an inclined fountain describes a parabola whose middle ordinate (Fig. 42) will be

$$\frac{Tr}{5} \quad v^2 \sin^2$$

In applying these formulas to

hot gases, that is to say, to a light liquid in motion within a heavy liquid, it is necessary to turn the diagram upside down, as the particles in motion are acted upon, not by their weight and gravity in a downward direction, but by the difference between the weight of the particles in motion and a corresponding volume of the medium within which their motion takes place. The resultant force will act in an upward direction, thus inverting the diagram, as is indicated in Fig. 43.

Yesmann has developed the following expression for an infinitely thin jet of hot gases, projected from the port of an open-hearth furnace: